

## Abstract

Steel blocks for the manufacture of moulds for the injection moulding of plastics material or for the manufacture of metal-working parts having a thickness greater than 20 mm, of which the structure is completely martensitic or martensito-bainitic, of which the hardness is between 430 HB and 530 HB and of which the chemical composition comprises, in % by weight:  $0.180\% \leq C \leq 0.40\%$ ;  $Si \leq 0.8\%$ ;  $Mn \leq 2.5\%$ ;  $Ni \leq 3\%$ ;  $Cr \leq 3.5\%$ ;  $Mo + W/2 \leq 2.8\%$ ;  $V + Nb/2 + Ta/4 \leq 0.5\%$ ;  $Al \leq 0.4\%$ ;  $Ti + Zr/2 \leq 0.1\%$ ;  $0.0005\% < B < 0.015\%$ ;  $S + Se + Te < 0.2\%$ ;  $Pb + Bi < 0.2\%$ ;  $Ca < 0.1\%$ , the remainder being iron and impurities resulting from production, the chemical composition also satisfying the following equations:  $3.2 \leq Tr \leq 9$ ;  $85 \leq Dr \leq 95$ ;  $U/Dr \leq 10.0$ , wherein  $Tr = 1.8xC + 1.1xMn + 0.7xNi + 0.6xCr + 1.6xMo^* + K$  wherein  $K = 0$  if the steel does not contain boron and  $K = 0.5$  if the steel contains boron;  $Dr = 54xC^{0.25} + 24.5x(Mo^* + 3xV^*)^{0.30} + 1.58xMn + 0.74xNi + 1.8xSi + 12.5x(Cr)^{0.20}$ ;  $U = 1600xC + 100x(0.25xCr + Mo^* + 4.5xV^*)$ ;  $R = 3.8xC + 10xSi + 3.3xMn + 2.4xNi + 1.4x(Cr + Mo^*)$ ;  $Mo^* + 3xV^* \geq 0.4\%$ ;  $Mo^* = Mo + W/2$ ;  $V^* = V + Nb/2 + Ta/4$  and  $B \geq 1/3 \times K_1 + 0.5$  wherein  $K_1 = \text{Min}(I^*; J^*)$ ;  $I^* = \text{Max}(O; I)$ ;  $J^* = \text{Max}(O; J)$ ;  $I = \text{Min}(N; N - 0.29(Ti + Zr/2 - 5))$ ;  $J = \text{Min}(N; 0.5(N - 0.52Al + \sqrt{(N - 0.52Al)^2 + 283}))$ .

Figures: none